

AVRflash[®]

User manual

AVRprog[®] programmer is a high performance tool used for programming AVR microcontroller families from ATMEL[®]. The AVRflash program communicates to the microcontroller through a USB cable which is also used for powering the AVRprog programmer.

Program

 **MikroElektronika**

SOFTWARE AND HARDWARE SOLUTIONS FOR EMBEDDED WORLD ...making it simple

TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and having confidence in MikroElektronika.

It is our intention to provide you with the best quality products. Furthermore, we will continue to improve our performance to better suit your needs.

A handwritten signature in white ink, appearing to read 'Nebojsa Matic', is positioned above the printed name and title.

Nebojsa Matic
General Manager

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1.0. Introduction to AVRprog® Programmer

The *AVRprog* programmer is a great tool used for programming AVR® microcontrollers from Atmel®. Given that it is a low power consumption device, it is ideal for working with portable PCs. It is very popular tool among beginners and professional users alike, for its unique design and simplicity. In order to use this programmer, it is necessary to have the *AVRflash* program and appropriate driver, provided on the product CD, installed on your PC. The *AVRflash* program communicates to the microcontroller through a USB cable which is also used for powering the *AVRprog* programmer.

The *AVRprog* programmer is built into all AVR development systems designed by MikroElektronika. There is also a stand-alone *AVRprog* programmer used for programming AVR mikrokontrollere built into (soldered on) the target device.

The *AVRprog* programmer is built into all MikroElektronika's development systems designed for working with AVR microcontrollers.

The *AVRprog* programmer is also available as a stand-alone device used for programming AVR microcontrollers built into (soldered on) the target device.

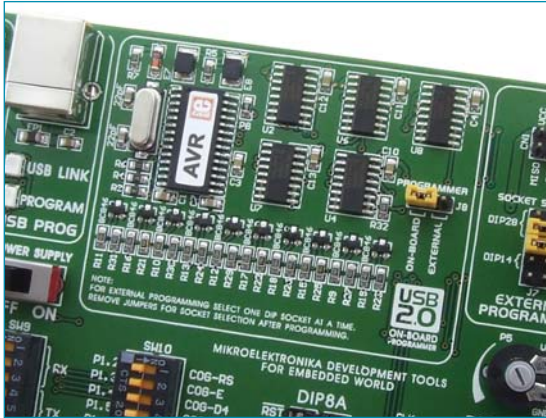
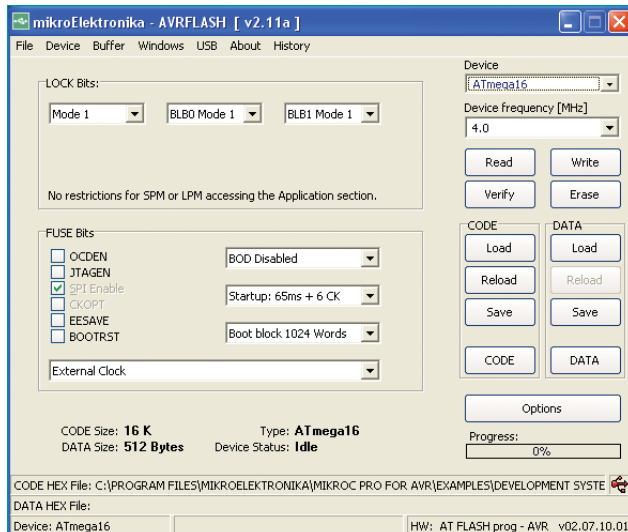


Figure 1-1: On-board *AVRprog* programmer



Figure 1-2: Stand-alone *AVRprog* programmer

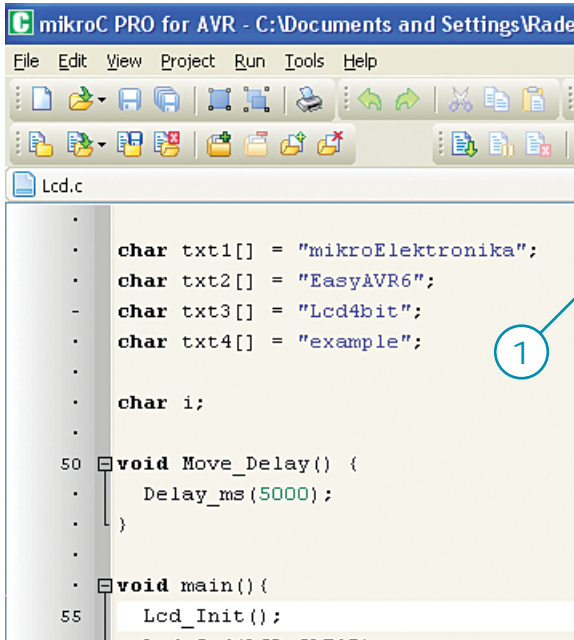


The *AVRflash* program contains an option for selecting the microcontroller to be programmed. The latest version of this software with updated list of supported microcontrollers can be downloaded free of charge from our website at www.mikroe.com

Figure 1-3: *AVRflash* program is used for programming AVR microcontrollers from Atmel

2.0. Dumping Code into the Microcontroller

The programming process starts by writing a program in some AVR compiler such as *mikroC PRO for AVR*, *mikroBASIC PRO for AVR*, *mikroPASCAL PRO for AVR* etc. Once the program has been written, it is necessary to compile it into appropriate format which can be loaded into the microcontroller. The program to be loaded into the microcontroller has the *.hex* extension. The last step is to write the generated HEX file into the microcontroller using the *AVRflash* program.

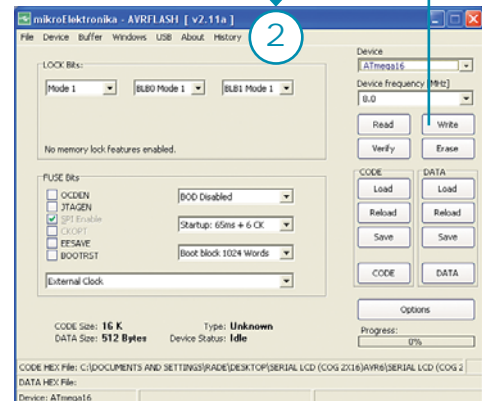


- 1 Write a program in some AVR compiler and generate a HEX code;
- 2 Use the *AVRflash* program to select the microcontroller to be programmed and load the HEX code;
- 3 Click the *Write* button to dump code into the microcontroller.

Compiling program

1110001001 Bin.
0110100011
01112FC23AA7
1011F43E0021A
Hex. DA67F0541

Loading HEX code



On the right side of the *AVRflash* program's main window there are a number of options which will make the programming process easier. Positioned in the right bottom corner, the *Progress* bar is used for monitoring the programming process.

3.0. AVRflash Program's Operation

The *AVRflash* program is easy to use as all the options necessary for its operation are provided in a simple window which will appear either by clicking on the AVRFLASH icon or automatically by starting the compiling process in the AVR compiler (*Build And Program* option). The options used for setting configuration bits are provided on the left side of the window, whereas the options for loading HEX file into the programmer and the microcontroller are provided on the right side of the window. The layout of the left side of the window varies depending on the microcontroller's type and configuration bits.

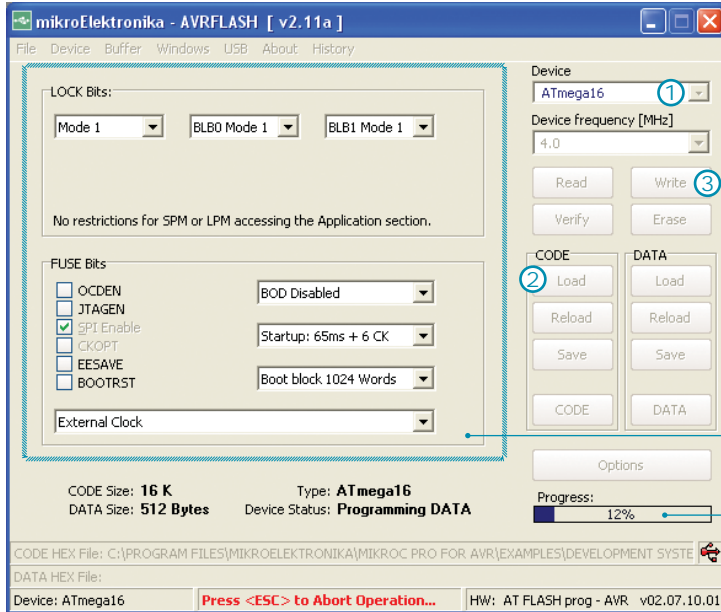


Figure 3-1: AVRflash program's main window

The *AVRflash* program enables a HEX code, generated in some of the AVR compilers, to be loaded into the microcontroller. The HEX code should be first loaded into the programmer's buffer by clicking the *Load* option, then into the microcontroller by clicking the *Write* option within the programmer's main window. The programming progress will be shown in the *Progress* bar in the bottom right corner of the same window.

In order to prevent a loaded code from being accidentally changed, LOCK bits are to be used. Depending on the protection level, one of the three available modes may be employed:

- Mode 1 - protection disabled
- Mode 2 - reprogramming disabled, code reading enabled
- Mode 3 - full protection, both reprogramming and code reading disabled

FUSE bits are primarily used for selecting the microcontroller's operating mode when it is turned on. These bits also have other functions such as selecting clock signal source, enabling the operation of built-in JTAG interface, selecting reset vector etc. Only experienced users are advised to change these bits. By selecting the microcontroller from the *Device* drop-down menu (Figure 3-1, no. 1), all relevant settings of FUSE bits will be automatically performed.

To load the program into the microcontroller, follow these steps:

- ① Select the microcontroller to be programmed and the *AVRflash* will automatically set default parameters for working with the respective microcontroller
- ② Click the *Load (CODE)* option to open the window to select the HEX code to be loaded into the microcontroller
- ③ Click the *Write* option to start programming the microcontroller

Settings for configuration bits varies depending on the type of the microcontroller

The *Progress* bar shows the programming progress expressed in percentages

4.0. Software Installation

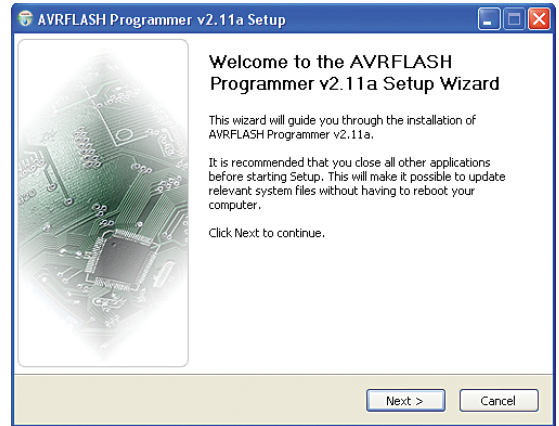
Before using the *AVRflash* program, it is necessary to install the appropriate driver. For more information on installing USB drivers consult the relevant manual.

Step 1: Start installation

Insert the product CD into your PC drive. After a few seconds, a list with all MikroElektronika's products will appear on the screen. To start the installation process of the *AVRflash* software, click on the setup icon provided in the *AVRflash* section on the product CD:

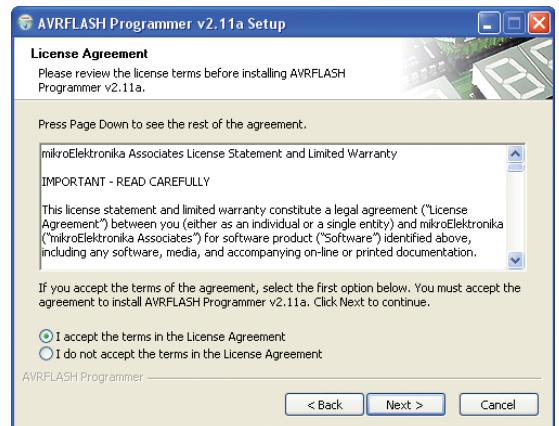
CD Drive:/zip/AVRFlash_setup.exe

You can also download the *AVRflash* programmer free of charge from our website. In this case the installation starts from your hard drive. A welcome window appears. Click *Next* to proceed.



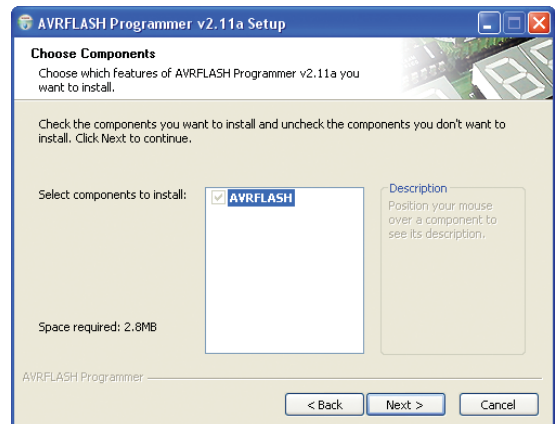
Step 2: Licence Agreement

Before you start the installation procedure, please review the licence agreement terms. To accept them, select the option *I accept the terms in the Licence Agreement* and click *Next*.



Step 3: Choose Components

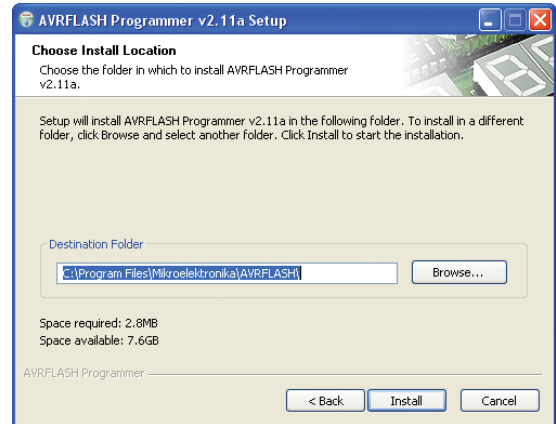
To make your choice uncomplicated, this installation step offers you only one component to choose. Click *Next*.



Step 4: Choose Installation Location

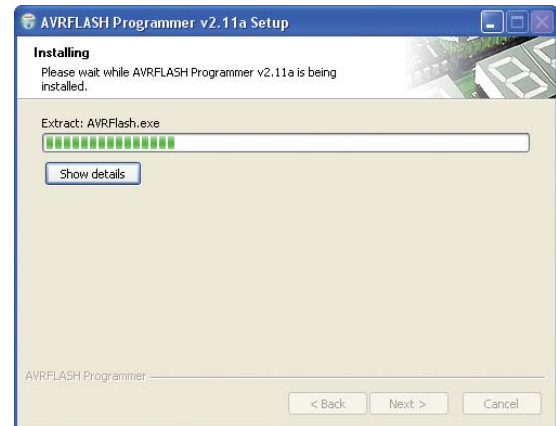
Next, you should specify the folder to install the *AVRflash* program in. If you wish to install it in a folder different from default, click *Browse* and select another folder on your hard disc. Then click *Next*. If you choose the default folder, the program will be installed on the following location:

C:\Program Files\Mikroelektronika\AVRFLASH



Step 5: Installation Details

The *AVRflash* programmer installation starts immediately. The installation progress will be shown on the screen. If you are interested in details about the installation, click the *Show details* button.



Step 6: Completing Installation

Windows will inform you, as shown in figure on the right, that the *AVRflash* programmer has been successfully installed. Click *Finish* to complete the installation.

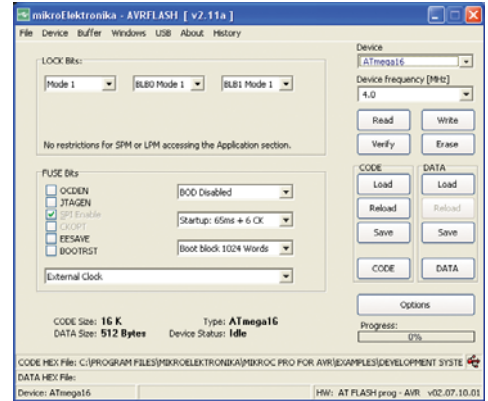


5.0. Practical Example of Using AVRflash Program

After the software installation is complete, connect the programmer to your PC using a USB cable. The USB connection will be automatically established, which is indicated by the *USB LINK LED diode's* illumination.

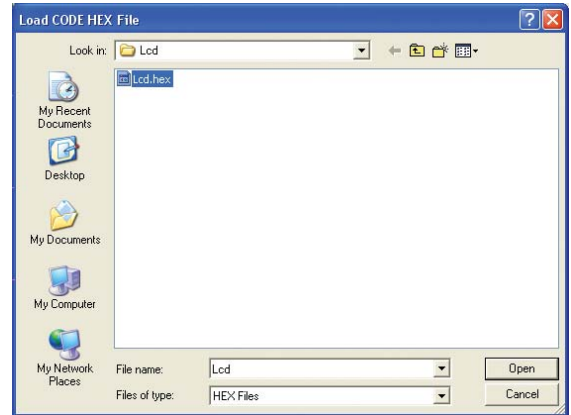
Step 1: Start up the AVRflash program

Start up the *AVRflash* program installed on your PC. Click the *Device* option in order to select the microcontroller to be programmed. The *AVRflash* program will automatically set default parameters for working with the respective microcontroller.



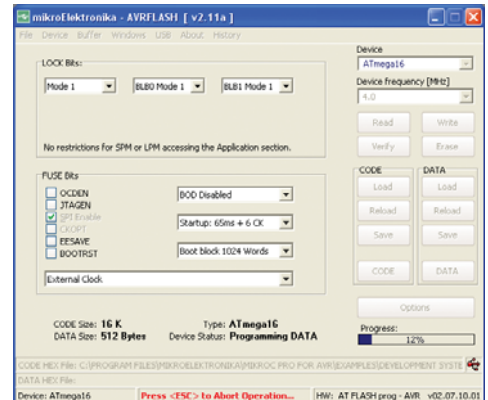
Step 2: Load a HEX file into the programmer's buffer

Click the *Load* button to open the *Open* window, as shown in figure on the right. Select the relevant file with the *.hex* extension and click the *Open* button. The file will be automatically loaded into the programmer's buffer.



Step 3: Load the HEX code into the microcontroller

Click the *Write* button in the upper right corner of the main window to start programming the microcontroller. The programming progress will be shown in the bottom right corner of the same window.



6.0. Keyboard Shortcuts and Command Line Parameters

Keyboard Shortcuts:	Alt-E	Erase microcontroller's memory
	Alt-B	Program memory blank check
	Alt-W	Write HEX code into AVR microcontroller
	Alt-V	Verify loaded HEX code
	Alt-R	Read program memory
	Alt-D	Change microcontroller type
	Ctrl-S	Save HEX code
	Ctrl-O	Open (Load) file with HEX code
	Ctrl-R	Reload HEX code

Command Line: The *AVRflash* program may also be activated from the command line, thus enabling you to use it from some other software, compiler etc. Here is a list of the command line parameters:

```
-w      Write to AVR microcontroller
-v      Verify
-e      Erase program from AVR microcontroller
-r      Read program from AVR microcontroller
-p      Microcontroller type (for example, ATmega16, AT90S2323 etc.)
-fc     Name of HEX file (FLASH) "[<name must be enclosed in quotation marks>]"
-fd     Name of data file (EEPROM) "[<name must be enclosed in quotation marks>]"
-LOCK:0x..... Specify values of LOCK bits
-FUSE:0x..... Specify value of FUSE bits
-q      Close the AVRflash program after programming
```

Example 1: **AVRFlash.exe -w -pATMEGA16 -v -f"C:\somefile.hex"**

This command is used for loading *C:\somefile.hex* into the ATmega16 microcontroller. This file is verified immediately after being loaded.

Example 2: **AVRFlash.exe -r -pATMEGA16**

This command is used for reading the ATmega16 microcontroller's program memory.

Example 3: **AVRFlash.exe -e -pATMEGA16**

This command is used for erasing program from the ATmega16 microcontroller.

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